Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
	)	
Proposed Changes in the Commission's Rules	)	ET Docket No. 03-137
Regarding Human Exposure to	)	
Radiofrequency Electromagnetic Fields	)	

Comments of Vocollect, Inc.

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December 8, 2003

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Pursuant to Section 1.415(a) of the Commission's Rules, Vocollect, Inc. submits these Comments in the above-captioned proceeding.[1] Vocollect is the global leader in voice technology and the growing range of industrial applications that put voice to work. Portable, unlicensed radio devices are key to Vocollect's business.[2]

A. Summary

SAR testing adds both cost and delay to the introduction of new portable wireless devices. Not only must charges incurred at the test lab be recovered through product sales, but delays that result from lab scheduling, the testing process, and preparation of the report all cut into the time the product can earn revenue on the market. Unneeded SAR testing amounts to an unintended tax on innovation.

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[1] *Proposed Changes in the Commission's Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields*, ET Docket No. 03-137, Notice of Proposed Rule Making, FCC 03-132 (released June 26, 2003) (Notice).

[2] Since its founding in 1987, Vocollect's sole focus has been developing and implementing proven voice solutions for industry. Today Vocollect has hundreds of installations and tens of thousands of "Talkman" computer terminals on the job around the world, using advanced speech recognition and synthesis to enable workers to talk directly to their host systems. Vocollect is the global leader in voice-directed distribution systems, accounting for nearly ninety percent of those systems in use today. Vocollect systems are currently at work in a variety of applications ranging from picking, receiving, replenishment, and other critical distribution functions, to quality control and data collection -- virtually any function in which it is faster and easier for people to speak to a computer rather to enter data manually.

No one questions the importance of SAR compliance to protect both occupational users and the public. For devices below some threshold power level, however, the SAR readings are consistently so far below the Commission's limits that routine testing is unnecessary to ensure compliance. Just as a flashlight battery is incapable of delivering a dangerous electric shock, a radio transmitter of sufficiently low power is incapable of delivering dangerous levels of radio-frequency energy.

Vocollect supports the Commission's proposal to require SAR testing of Section 15.247 devices above some minimum power level. But we urge the Commission to (1) affirmatively exempt devices below the cut-off power level from routine SAR testing; (2) set the cut-off at 125 mW, rather than 100 mW as originally proposed; and (3) extend the low-power exemption from SAR testing to all Part 15 devices, not just those under Section 15.247.

Increasingly, portable devices may contain multiple transmitters. When these are of greatly disproportionate powers, the lower-powered transmitters make no significant contribution to the total SAR, and so can safely be ignored. Vocollect proposes a rule allowing applicants to disregard transmitters in a device whose combined power is less than 10 percent of the most powerful transmitter in the device.

Finally, a requirement for new SAR testing each time a transmitter module is installed in a new host device largely undoes the benefits of transmitter modules. Vocollect proposes a bifurcated approach: (1) if a transmitter module is under 125 mW, then installing it in a new host device, with no change in proximity to the body, should not require any testing; and (2) if the transmitter module is over 125 mW, then its installation in a new host device should be treated as a Class I or Class II permissive change. SAR testing and Class I or Class II treatment would also apply when a new host device brings the antenna closer to the user's body -- for

example, when a transmitter module previously certified in a handheld host device is newly installed in a body-worn device.

These proposals fully protect the public while giving manufacturers the flexibility they need to foster innovation.

B. The Commission Should Categorically Exclude Part 15 Devices with Power Less Than 125 mW from SAR Evaluation.

The Notice seeks comment on whether the Commission should require routine SAR testing of devices authorized under Section 15.247, designed for use within 20 cm of the body, with a maximum peak output that exceeds 100 mW.[3] Vocollect agrees the Commission should impose such a rule, but only if it affirmatively eliminates any requirement for SAR testing of such devices whose power is below the cut-off. Further, as explained below, we believe the Commission can safely raise the cut-off to 125 mW.

1. Low-power Section 15.247 devices should not be subject to routine SAR evaluation.

The Commission's Rules provide that unlicensed transmitters, including those authorized under Section 15.247, are categorically excluded from routine evaluation for RF exposure.[4] The Commission nonetheless has routinely required SAR testing for portable Section 15.247 devices. That substantially increases the cost and delay of introducing of new products. Direct, out-of-pocket costs for conducting each SAR test are approximately $5,000. It takes at least a week to conduct the tests and issue a report. In practice, delays often run far longer due to difficulties in

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[3] Notice at para. 18. SAR (Specific Absorption Rate) is a measure of radio-frequency energy absorbed in tissue and dissipated as heat. *See Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*, OET Bulletin 65, Edition 97-01 at 5 (August 1997).

[4] 47 C.F.R. Sec. 1.1307(b)(2) (last sentence).

scheduling test lab facilities. A recent project under development at Vocollect estimates a loss of $30,000 dollars in revenue *every week* the product is delayed in reaching the market. Thus, in today's highly competitive and fast-moving environment, a few weeks' lost sales due to SAR testing can make a significant difference in return on the product. This directly increases the risk of investing in new product development, and hence acts as a needless disincentive to innovation.

Vocollect does not oppose the Commission's codifying a requirement for SAR testing of Section 15.247 devices above some minimum power level.[5] At the same time, however, we ask for a rule provision affirmatively stating the Commission will *not* require SAR testing for Section 15.247 devices below that level, absent some specific and credible reason to believe an individual product poses an extraordinary risk of RF exposure. This bifurcated approach will serve the public interest by moving harmless, lower-powered devices to the market more quickly and at lower cost, while freeing up the Commission's and manufacturers' resources to focus on higher powered products that may in fact require study to ensure they pose no risk.

2. The cut-off for SAR evaluation should be set at 125 mW, not 100 mW as proposed.

The Commission's proposed cut-off of 100 mW for required SAR testing is unnecessarily conservative. Vocollect's experience shows the cut-off can be set at 125 mW and still leave a more than adequate margin of safety.

The following table shows data from a few radios representative of those Vocollect uses in its products. Even radios operating at 112 mW and 100% duty cycle are more than 10 dB

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[5] Notice at para. 18.

below the maximum permitted SAR. We find that SAR scales linearly with duty cycle, so at a more typical 33% duty cycle, the measured SAR is approximately 15 dB below the maximum.

Radio Card	Max. Output Power (mW)	Separation Distance (cm) (see note)	Max. SAR in 1g at 100% duty cycle (W/kg)	Max. Permitted SAR (W/kg)
Cisco 11Mb DSSS	112	0.0	0.150	1.6
Symbol 2Mb FHSS	112	0.0	0.142	1.6
Symbol 11Mb DSSS	55	0.0	0.0827	1.6

Note on separation distance: The distance shown is measured with respect to the outside of the case. The antenna is embedded within the device inside the case, approximately 3 cm from the nearest point of contact with the user's body.

Measured vs. Maximum SAR
Table 1

In short, given the considerable headroom, the Commission can safely set the cut-off for required SAR testing at 125 mW output power.

3. Categorical exclusion for low-power transmitters should extend to all Part 15 devices, not just those under Section 15.247.

If the Commission proceeds as we suggest to categorically exclude Section 15.247 devices under 125 mW from SAR testing, then it should go a small step further and similarly exclude any Part 15 device under 125 mW. Nothing in the physics suggests similarly-powered transmitters using other modulations will generate higher SAR values than spread spectrum or digital modulation transmitters. If a low-power categorical exclusion provision makes sense for Section 15.247 devices -- and we think it does -- the same treatment should extend to any Part 15 transmitter.

C. Evaluations of SAR Contributions from Multiple Transmitters in the Same Device Should Disregard Any Whose Combined Power Is less than 10% of the Most Powerful Transmitter.

The Commission proposes to evaluate multiple transmitters in the same device by summing the SAR values -- either by summing at individual grid points prior to calculating the averaged SAR, or simply by summing the average SARs.[6] Vocollect has no preference between these two approaches, which should usually give similar results.

We submit, however, that in cases where one transmitter in the device seriously out-powers the others, only the higher-power transmitter need be evaluated. Contributions of the others will be negligible. Although SAR need not scale linearly with output power, any departures from linearity in the lower-powered transmitter will remain small compared to the SAR from the higher-powered transmitter. Thus, to an excellent first approximation, highly disproportionately powered transmitters will always yield highly disproportionate SARs.

Illustrating this point is the example in the Notice of a laptop computer with a Bluetooth transmitter.[7] Today many Bluetooth-equipped laptops also have Wi-Fi capability. A typical Wi-Fi transmitter for a battery-powered laptop use might operate at about 40 mW, while most Bluetooth transmitters put out just a milliwatt or so.[8] The power discrepancy is thus about 16 dB. Even if the Bluetooth transmitter had twice the SAR per milliwatt of output compared to the Wi-Fi transmitter, the Bluetooth SAR would still be 13 dB below the Wi-Fi SAR. In such a case

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[6] Notice at para. 32.

[7] Notice at para. 31.

[8] Bluetooth provides for three "power classes" with *maximum* powers of 1 mW, 2.5 mW, and 100 mW. *See* Bluetooth Specification 1.2, Part A at 33 (Nov. 5, 2003). Most portable Bluetooth devices use the lower powers. And the *nominal* power for the 2.5 mW maximum is only 1 mW. *Id.* (The discussion in text would not apply to a 100 mW Bluetooth device.)

the Bluetooth transmitter makes no significant contribution to the total SAR. In addition, most transmitters in portable devices operate on duty cycles well below unity. This not only reduces the SAR contribution from each transmitter, but also greatly reduces any cumulative effect by lowering still further the fraction of time during which both transmitters are operating simultaneously.

As explained above, the cost and delay of SAR testing make up a major expense for manufacturers. In devices with disproportionately powered transmitters, testing the lower-powered transmitters does not contribute to a safer product. The Commission should not require SAR testing of transmitters whose combined power is less than 10% of the most powerful transmitter in the device.

D. The Commission Should Minimally Regulate Installation of a Transmitter Module in a New Host Device.

The Notice raises several options for addressing the case of a previously certified transmitter module in a new host device. The Commission has long allowed certification of transmitter modules,[9] and indeed recently proposed to codify the concept into its rules.[10] The purpose of modular transmitters is to "eliminat[e] the requirement that a new equipment authorization be obtained for the same transmitter when it is installed in a new device."[11] But that purpose is largely defeated when manufacturers must incur the cost and delay of SAR

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[9] *Part 15 Unlicensed Modular Transmitter Approval*, Public Notice, DA 00-1407 (released June 26, 2000).

[10] *Modification of Parts 2 and 15 of the Commission's Rules for Unlicensed Devices and Equipment Approval*, ET Docket No. 03-201, Notice of Proposed Rulemaking, FCC 03-223 at paras. 31-42 (released Sept. 17, 2003).

[11] *Part 15 Unlicensed Modular Transmitter Approval*, *supra*, at 1.

testing for each new host device. Below we propose a regulatory regime to minimize this problem without any appreciable risk of exposing users to excessive RF fields.

1. Use of a transmitter module under 125 mW in a new host device, with no change in proximity to the body, should not require any testing.

The Commission asks whether it should permit a certified transmitter module to be installed in a new host device as a Class I permissive change, assuming no increase in measured SAR values.[12] A Class I change presupposes no degradation of the values on which the Commission relied in granting the original certification.[13] The proposal thus carries an implied requirement for new SAR tests each time a transmitter module is installed in a new host device. As noted, that entails cost and delay.

In the context of regulating emissions to protect against interference, the Commission ordinarily does not expect a retest after changes that, by their nature, are unlikely to affect the emissions. A manufacturer might change the color of the case from blue to green, for example, without retesting. Changing the case material from metal to plastic, on other hand, might reasonably trigger a retest because it can increase emissions.

In the SAR context, it is more difficult to tell in advance which changes might cause increased readings. It is more practical to identify a category of transmitter modules for which *no* change in host device is likely to take the SAR out of compliance, and simply exempt that category from regulatory attention.

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[12] Notice at para. 21.

[13] 47 C.F.R. Sec. 2.1043(b)(1).

As we noted in Part B.2 above, Vocollect's experience shows that Part 15 transmitters powered at under 125 mW or so typically pass the SAR tests with 10 dB or more of clearance. We do not believe that installing such a transmitter in a different host device realistically could increase the SAR by the ten-fold necessary to take it over the limit. If a transmitter under 125 mW were originally SAR-tested in a body-worn configuration (for example), we propose that a manufacturer be able to install that transmitter in any body-worn host device without further testing.[14] Of course there is a possibility that, if tested, the change in host device might cause an increase in SAR reading from one low value to another low value. But even so, the readings are all but certain to stay at least several dB under the limit. Thus, manufacturers should be able to move low-powered transmitter modules from one host device to another, so long as distance to the body does not change.

SECTION 15.247 DEVICE AS TRANSMITTER MODULE. The Commission proposes authorizing any Section 15.247 device under 100 mW as a transmitter module.[15] Vocollect concurs. For the same reasons given here, however, the maximum power for this treatment should be 125 mW.

2. Use of a transmitter module over 125 mW in a new host device, or a closer proximity to the body, should be treated as a Class I or Class II permissive change.

When the power of a transmitter module is 125 mW or more, and especially if it approaches one watt, there is an increased possibility that a different host device might take the

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[14] We argue above the Commission should categorically exclude from SAR testing all Part 15 transmitters under 125 mW. If the Commission adopts that position, then the separate provision requested here will be unnecessary.

[15] *See* Notice at para. 21.

SAR readings close to or over the limit. Such transmitters should be subject to provisions that parallel those for changes that affect emissions under Section 2.1043(b). The grantee should be expected to conduct SAR tests of transmitter modules over 125 mW in each new host device. If the SAR does not increase from the original certification (or a previous Class II change) the grantee should be permitted to treat the modification as a Class I change and market the transmitter for the new host device without notifying the Commission. If the SAR does increase, the grantee should submit an application for a Class II change. If granted, that SAR then becomes the threshold for Class I *vs*. Class II changes for that transmitter module in future host devices.

Similarly, we agree SAR testing is necessary when a transmitter module is installed in a new host device that brings the antenna closer to the user's body -- for example, when a transmitter module previously certified in a handheld host device is newly installed in a body-worn device. Again, however, Commission approval should be necessary only if the measured SAR increases.

Vocollect submits these provisions will fully protect the public while encouraging innovation in the form of new product designs.

CONCLUSION

RF exposure regulations that seemed both simple and comprehensive just a few years ago have since become difficult to apply, due in large part to the stunning proliferation of wireless devices. In reexamining its rules, the Commission must balance unnecessarily broad margins of safety against the cost and delay of bringing products to market. Nothing in these comments advocates compromising safety. We do ask the Commission to recognize that lower-powered devices -- those producing SAR levels far below the limits -- can be regulated more flexibly than

at present. This will yield better products at lower cost for consumers and industry, without any increase in risk to either occupational users or consumers.

Respectfully submitted,

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December 8, 2003

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